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## **Senior Capstone: Regulating DeFi and Crypto**

### Introduction

Sitting here writing this today there is an incredible amount of buzz surrounding the topics of blockchains, cryptocurrencies, and decentralized finance (DeFi). For the purpose of this paper and simplicity, we'll lump the first two topics into the third even though they are robust, stand-alone ideas worthy of distinction; they both are major underpinnings of DeFi, with blockchains being the bedrock of cryptocurrencies, and blockchains and cryptocurrencies combining to be the bedrock of decentralized finance. The field is becoming richer and richer each day. This is not just in a monetary sense, though the amount of venture capital money flowing into crypto and Web 3.0 (the next iteration of the internet based on the concept of decentralized control) startups has been ballooning, but rather in terms of the brainpower, energy, and human capital resources being devoted to evolving DeFi from a budding field to mainstream reality. While taking CSCI 1951L: Blockchains and Cryptocurrencies in Brown University's Computer Science department this semester, the following question was on my mind: what will it take for the technologies that we are learning about to percolate through the mainstream financial world? While the nascent decentralized finance industry has some of the world's brightest minds working in it, there will need to be some additional push for everyday people and current mainstream companies to buy in completely and trust this new system. That additional push is most likely formal government regulation, and this paper will look into why regulations might be required and what they may look like.

## Discussion of Select Issues in DeFi

Before diving into the future of decentralized finance and the regulation that would support it, let us take a closer look at why the industry requires regulation for it to succeed in replacing the centralized financial system of today. We will do this by presenting a few of the apparent issues in the decentralized system: the notion of code as law, price volatility, and money laundering. These three issues can be placed into three overarching categories- technological risk, asset risk, and compliance risk.

The first issue is the fact that in the current, unregulated landscape “code is law.” Smart contracts built on blockchain networks like Ethereum govern the flow of transactions. These smart contracts consist of code that is executed automatically on behalf of network participants when certain calls are made and or certain criteria are met. There are no intermediaries governing the transaction and the exchange of assets, making the code underlying the smart contract the “law.” What happens, though, when a smart contract gets exploited, such as when hackers are able to extract unearned assets from another party via a smart contract simply by “telling” the contract to do so? This would be technically following the “law” of the code so can it even be considered real theft? Without any enforceable regulations, it can be hard to consider it so. However, the parties on the losing side certainly think of it as such and in some cases have almost turned to authorities for help.

For example, a record setting \$600 million worth of cryptocurrencies were stolen from the Poly Network in August 2021.<sup>1</sup> The Poly Network is a “cross chain” tool run by smart contracts that holds pools of assets on multiple blockchains and allows users to transfer their crypto assets between platforms.<sup>2</sup> In a *Lawfare* blog, author Nicholas Weaver highlights the public nature of smart contracts in that they run on public blockchains and anyone can interact

with them through sending requests, much unlike the private contracts of centralized bank accounts.<sup>2</sup> This result in ambiguities regarding theft that cannot be resolved in public courts given the lack of current government regulations. With traditional contracts, the spirit of the agreement can be upheld in court and loopholes rendered invalid- a luxury not shared by smart contracts. The Poly Network ended up publicly asking the hacker that stole from them to return the money, which ended up working for them, as the hacker returned all the stolen funds and they dropped their intentions of involving public authorities.<sup>1</sup> Other afflicted actors in the space cannot rely on being so lucky when their code gets exploited, and there are a number of examples of smart contracts being exploited for unrecoverable losses. The Poly Network hack was an example with a happy ending, but one example that did not see restoration of funds is the Parity Multi-signature Wallet Hack in 2017. The hacker was able to steal \$30 million worth of ether “by exploiting the delegatecall and fallback function” of the smart contract.<sup>3</sup> A quick search would lead one to the many other instances where smart contracts were exploited resulting in a loss of funds from an innocent party. So, the “code is law” facet of DeFi in its current state is certainly evidence that “government law” may be required to regulate this new frontier.

Next, the volatility of crypto assets is one of the issues that affects the decentralized financial system. If we take the previous issue raised above to be labeled technological risk, extreme price volatility of cryptocurrencies can be considered asset risk.<sup>4</sup> The basis of asset risk stems from the fact that in DeFi transactions cryptocurrencies are usually pledged as collateral.<sup>4</sup> As law firm King & Spalding<sup>4</sup> describe it, “Given the volatility of digital assets, it is possible for the value of that collateral to decline sharply, causing associated liquidity risks. This, in turn, can fuel a broader sell-off, and this uncertainty and instability can lead to catastrophic “bank runs” that send token values plummeting.” No investor is safe from this risk no matter their level of

sophistication. Even billionaire entrepreneur/investor Mark Cuban “called for regulation of DeFi after a DeFi token he held crashed to zero in one day as a result of a ‘bank run’ on the token.”<sup>4</sup> Investors losing their money when knowingly placing their money into risky, volatile assets may not be enough to claim the DeFi needs regulation, but the implications of this volatility on the system are concerning. When the COVID-19 pandemic was unfolding, panic in the markets led to mass sell off and an article from Cointelegraph<sup>5</sup> notes how “[t]he total market capitalization of the cryptocurrency sector plummeted by over 25% in a span of hours.” In one day, Bitcoin and Ether fell by 48% and 43%, respectively.<sup>5</sup> Given that a large portion of decentralized finance transactions rely on the Ethereum blockchain, the DeFi system felt the repercussions of this volatility in that “millions of dollars' worth of value was liquidated and DeFi applications temporarily stopped functioning.”<sup>5</sup> Cointelegraph adds how while price volatility is inherent in crypto markets DeFi cannot afford to accept mass liquidations and breakable applications as the status quo. Furthermore, DeFi’s burdensome goal of removing centralized intermediaries from the financial system will not be attainable if its gears are breakable.<sup>5</sup> Regulation could be the answer for the nascent industry’s infrastructure in order to be able to withstand dramatic day-to-day price changes.

The last specific issue we’ll look at is that of money laundering, which can be categorized under compliance risk in the current DeFi landscape. This paper has already established how DeFi seeks to replace traditional banks that serve as intermediaries in the centralized landscape through automatic software programs. The result of this is financial services being offered by unincorporated entities operating outside of the traditional regulatory structures in mainstream finance. The lack of regulated intermediaries combined with the anonymity of the peer-to-peer transaction structure leads to zero notion of KYC, the “know your customer” standard due

diligence that centralized financial institutions require. The implications involve the potential of funding criminal activity as nefarious actors can launder money through the anonymity of the decentralized peer-to-peer transactions that require no confirmation of identity. DeFi participants and platforms are thus subject to compliance risks that could result in legal entanglement, and could have the potential to be quite confusing given the lack of any clear, direct regulatory guidance from authoritative bodies.<sup>4</sup> A Wall Street Journal article discussing a study done by blockchain data platform Chainalysis, Inc noted that “cybercriminals laundered about \$8.6 billion in cryptocurrency in 2021” and \$33 billion since 2017.<sup>6</sup> It is important to mention, though, that “the report said money laundering accounted for a small percentage of overall cryptocurrency transaction volume, about 0.05%” in 2021.<sup>6</sup> Furthermore “the money-laundering activity within digital assets also is heavily concentrated among a few crypto services, the report said, noting that about 58% of all funds sent from illicit addresses moved to five services in 2021.”<sup>6</sup> The upshot is that money laundering represents only a tiny fraction of DeFi activity and is concentrated enough for authorities to go after prominent malicious actors. Additionally, these circumstances may even make it easier for regulation to be put in place.

### Reasons against Regulation

Now that we have explored a few of the specific issues that currently exist with decentralized finance and the broader categories they fall under, it is clear there are problems in the space which the decentralized system cannot necessarily rectify on its own. However, in discussing the potential of regulation, arguments against government oversight and regulation would likely emerge. The next section of this paper will briefly explore a few reasons why some are against regulation in decentralized finance.

The first reason some are weary of crypto regulation is that it has the potential to stifle innovation. Emma Newbury from the Motley Fool notes how the crypto sector has thrived due to promises of disrupting the traditional ways of conducting finance and because of lower startup costs resulting from not needing to build centralized networks and infrastructure.<sup>7</sup> She additionally notes how flexible fundraising models have contributed to the flourishing of the sector, as money can be raised quickly from a broad range of investors without the need to comply with complex security laws. While the risk for investors remains, the benefit is a faster, more streamlined allocation of resources to projects looking to move the sector forward. The president of blockchain startup Ava Labs, John Wu, shares this sentiment. Wu writes how while regulation may raise the barrier to entry in the space and limit access to high quality ventures, regulation inevitably “screens out high potential projects due to the financial and regulatory strain that managing a compliant issuance places on smaller, capital-starved companies.”<sup>8</sup> Ultimately, regulations would limit the number of entrants into the space, which would have an adverse effect on the overall levels of brainpower and innovation in the space. Secondly, Newbury mentions that regulation in the US would simply push the cryptocurrency and DeFi ecosystem to other, less regulated countries.<sup>8</sup> The implications of this would be that the US loses out on the economic gain of the growing industry and cities like Miami and states like California, who have invested into their crypto ecosystems in an attempt to attract talent and adoption, could see lackluster returns on millions of dollars of crypto infrastructure investment.

The third reason, which was actually the first mentioned by Newbury, is the one with the most debate to be had regarding it, and that is regulation goes against the spirit of DeFi and cryptocurrency. The essence of cryptocurrency and decentralization is to eliminate centralized intermediaries like banks and government organizations from financial transactions. It transfers

autonomy and liberty back to individual actors to finance and transact on their own behalf while taking power away from the aforementioned intermediaries. Regulation would essentially retreat on this paradigm. In her Bitcoin.com article “Crypto Needs Less Government Regulation – Not More,” Wendy McElroy responds to a call for regulation from another article author, Peter Lin, by noting the arguments in Lin’s article were based on the underlying assumption that “the free market cannot provide necessary standards for crypto and the state must step into the void.”<sup>9</sup> McElroy’s argument against regulation stems from the idea that regulation breaks from the spirit of cryptocurrency and that the crypto free market can and should be left alone for the development of its own standards. McElroy takes issue with Lin’s statement “that only the state can resolve ‘valid concerns’ regarding the future of crypto” and further issue with his reasoning that it is “because ‘even the most devout supporters ... could agree that the growth of this industry depends, in part, on the establishment of safe, fair and reliable market conditions.’”<sup>9</sup> She asserts that many devout supporters, if not most, in fact do not agree with Lin’s statement. This is not something that can be settled by accepting one author’s word over another, but it raises questions about what devout supporters truly believe about their expanding space.

Where McElroy’s argument begins to get interesting is in the problem she takes with the logic behind Lin’s statement on industry growth resting upon reliable market conditions. She considers it an odd leap of logic to equate “‘market conditions’ with the condition of being regulated by a central authority.”<sup>9</sup> Instead, McElroy asserts that “Market conditions, good or bad, are not “established” by authority; they are a natural result of the cumulative choices and exchanges of individuals.”<sup>9</sup> McElroy goes on to mention her book *The Satoshi Revolution* in which she provides economic, social, and moral answers as to why an unrestrained free market “is infinitely better at serving individuals than the state.”<sup>9</sup> While the book’s content will not be

reviewed in this paper, its driving point demonstrates that regulation might not be the next best, most necessary step for the crypto sector. One illustrative real life example of free market standards originating through natural evolution that McElroy raises in her article is that of the barrel measure of 42 gallons of petroleum. McElroy pulls from voluntaryist scholar Carl Watner, who she mentions studied the origins of free market standards to a degree that few others have, and his essay “Weights and Measures: State or Market?” Though this example could be used in any argument for free market liberty over state intervention, it is a refreshing reminder that autonomous individuals can come to effective agreements through a discovery process that is fragmented in the beginning. Watner explains how in the 1860s a barrel of oil simply referred to a cask, regardless of its size and variations persisted for over a decade until a “producer’s agreement resulted in a fixed price for a 42 gallon barrel of oil.”<sup>9</sup> The industry standard of 42 gallons per barrel that persists today arose from a competition of various interests over time and not the halls of any legislative body. Though this example may be niche, it makes one wonder what effective standards the crypto space might reach without regulation, which is what McElroy brings to light in her argument against crypto regulation.

### Regulation Landscape Today

Despite the arguments that exist against regulating the crypto space, the general sentiment seems to be that the sector is headed towards regulation. Given that we have now discussed some of the issues in decentralized finance and some reasons for not regulating the growing ecosystem, let us dive into the state of regulation today and get a glimpse of where we might be headed. In order to do so, we will have to return to a brief discussion of issues with DeFi and



even take a look at an incident occurring this past week in which a \$15 billion crypto network was wiped out and now worthless.

One instructive resource for getting a sense of the warming regulatory climate is the World Economic Forum's article titled "Cryptocurrency regulation: where are we now and where are we going?"<sup>10</sup> The article starts off by noting that at the time of writing in March 2022 the market capitalization of all digital currencies was \$1.7 trillion and that approximately \$90 billion worth is traded each day. This figure was closer to \$3 trillion back in November 2021, but since then the prices of leading currencies like Bitcoin and Ether have nearly halved. While we looked at the technological, asset, and compliance risks with decentralized finance, one glaring risk associated with cryptocurrencies that the WEF article highlights is that the cryptocurrency sector "has become so large that it could have macroeconomic consequences if mismanaged." The authors mention how an IMF study from this year found a correlation between bitcoin and the S&P 500, thus raising "fears of spillovers of investor sentiment between the stock market and cryptocurrencies." On top of this, they note that while there are data gaps for a comprehensive macroeconomic impact assessment, the Financial Stability Board "warned of implications for global financial stability if the current trajectory of growth in scale and interconnectedness of crypto-assets with these institutions continues." In the eyes of the WEF authors, these potentials evidence the need for prioritizing regulatory discussions and decisions, a conclusion that is obviously antithetical to the free market argument against regulation assessed in the previous section.

Building from the idea of macroeconomic implications introduced by the WEF article from March of this year, let us now turn to headlines from the past week that have put further pressure on legislative bodies to begin taking regulatory action. Last week, the Terra network, an

open source blockchain protocol underpinning the cryptocurrency Luna and stablecoin, UST, collapsed.<sup>11,12</sup> An article by Sylvan Lane from The Hill<sup>12</sup> discusses this collapse of Terra that has sent waves through the space, boosting calls for regulation. Lane notes that the declines in bitcoin and ethereum were the rumblings that led to Terra's fall. As mentioned, Terra encompassed the cryptocurrency Luna, which functioned like bitcoin, and the stablecoin TerraUSD (UST). This paper will not go into the details of stablecoins, but in brief stable coins can be tied to things such as fiat currencies, precious metals, or, like in the case of UST, other cryptocurrencies and algorithmic functions.<sup>13</sup> The Terra network pegged UST to the US dollar through an algorithm that either created or burned Luna depending on fluctuation in UST, and the price of UST was intended to remain \$1 even if Luna's price moved drastically. Without delving into the mechanics of the crash, Luna's price dropped nearly \$100 on Thursday to a penny per coin and "Terra's algorithm was unable to burn enough of the currency to prop up the value of UST... [leaving] both worthless"<sup>12, 14</sup> What can be said is that part of what caused the crash was around \$2.3 billion worth of assets in the protocol backing UST being withdrawn, causing the price of the stablecoin to dip below \$1.<sup>15</sup> This essentially sparked the chain of sell offs and arbitrage opportunities, whose logic and explanation is beyond the scope of this paper, but caused the wipeout of a nearly \$15 billion network. The network's founder also noted that the damage is too much for any rebuild so UST is gone for good.<sup>12</sup>

This fiasco has raised doubts on the integrity and reliability of the decentralized system, and showed that people will bolt with their investments if they feel they are at risk. In the words of Tyler Gellasch, a director at a non-profit financial research firm who Lane quotes in his article, "There's a reason why deposit insurance is important: It prevents runs on the bank... What we're really seeing in the crypto community is a really powerful, real-time proof of why

securities laws and banking laws exist.”<sup>12</sup> Lane mentions that while this collapse is shocking, it does not have the power to make large waves in the broader financial system given its “limited connections to non crypto assets and traditional financial firms.” However, Gellach noted that similar sell offs of stable coins backed by other legitimate financial assets has the ability to trigger broader dysfunction in the markets, a statement in agreement with the WEF article’s statement that crypto has the potential adverse macroeconomic implications.

To round out this section illustrating aspects of the current regulatory landscape, this paper will examine the Executive Order on Ensuring the Responsible Development of Digital Assets that United States President Joe Biden signed off on in March 2022. According to the WEF article, the “Executive Order commits the White House to taking part in research on cryptocurrencies and to engaging departments across the government to collaborate in the creation of a regulatory framework for digital assets.”<sup>10</sup> Interestingly, the White House Fact Sheet on the Executive Order<sup>16</sup> outlines the seven calls for measures which surround many of the issues this paper has brought forth. The first call for measures to *Protect U.S. Consumers, Investors, and Businesses* relates to Terra collapse discussed in the previous paragraph in how investors that have no guarantees on their investments through security laws which leads to bank runs on collapsing cryptos. The second call to *Protect U.S. and Global Financial Stability and Mitigate Systemic Risk* directly addresses the concern raised in the WEF article and by the UST/Terra disintegration of the past week. Third is a call for measures to *Mitigate the Illicit Finance and National Security Risks Posed by the Illicit Use of Digital Assets*, and this ties back to compliance risks mentioned in the first section of the paper in that DeFi has been a means for laundering billions of dollars. The call is for measures to *Promote U.S. Leadership in Technology and Economic Competitiveness to Reinforce U.S. Leadership in the Global Financial System*.

This call addresses one of the reasons against regulation of the sector, which was that the crypto ecosystem would shift to unregulated geographies in the case the US imposes regulations. The fifth call is for measures to *Promote Equitable Access to Safe and Affordable Financial Services*. The sixth call for measures to *Support Technological Advances and Ensure Responsible Development and Use of Digital Assets* hits on the technological risk issue discussed at the beginning in that with code being law there is a gray area in terms of what is theft or malpractice in the manipulation of faulty smart contracts. Finally, the last call to measure is to *Explore a U.S. Central Bank Digital Currency*. Overall, the Executive Order addresses many of the issues we've discussed regarding the decentralized financial system and provides a solid indication of where we will see government regulation in the future.

### The Future of Regulation

While the momentum in the current state is headed towards crypto regulation, there are some pieces in place for impending future regulations. The \$1.2 trillion Infrastructure Bill (“Infrastructure Investment and Jobs Act”) that President Biden signed in November is slated to “impose sweeping reporting requirements on cryptocurrencies by 2024 if upheld,” says an article written by experts at SIA Partners, a management consulting firm.<sup>17</sup> Specifically, the bill has provisions for “changing the classification of many cryptocurrency participants to 'brokers' and requiring reporting of cryptocurrency transactions greater than \$10,000 by 2024.” Despite the bill being signed, though, there is uncertainty regarding what regulations will look like concretely. However, the provisions currently outlined demonstrate that this will assist in fighting tax evasion in the crypto space. According to SIA partners, there are key regulatory questions for the crypto industry which include “whether the key articles of the Infrastructure Bill will be

upheld by 2024, if federal capital gains laws will change, if physically-backed crypto ETFs will be approved to trade, if banks get clearance to put crypto-assets on their balance sheets, and if major central banks will launch their own central-bank digital currencies (CBDCs).”<sup>17</sup> Also noted in the article is a fear shared by potential entrants in the industry who are currently sidelined as a result of the looming questions mentioned. This is one step towards regulation that even preceded the Executive Order outlined in the previous section, but its effects are yet to be seen and will be determined at a future point.

Next, a bill introduced in late March to both the House and the Senate by two U.S. lawmakers, Rep. Trey Hollingsworth (R-Indiana) and Sen. Bill Hagerty (R-Tenn.), called the “Stablecoin Transparency Act” has the potential to end the murkiness of stablecoin reserves. The bill would not only require stablecoin issuers to report on the status of their reserves but also the quality of assets in reserves.<sup>18</sup> Currently, the backings of stablecoins such as Tether and Circle have been the source of much speculation in the industry. Tether has been secretive about its backings and has defended itself that it does not want to give away its secret which has made it a success. This bill arises in order to be able to calm fears surrounding the backings of the growing stablecoin market. CoinDesk writes that “The now-\$180 billion stablecoin market has also become a concern for regulators, many of whom have voiced concerns about potential exposure risks for the broader economy in the event of a “run” on stablecoin issuers.”<sup>18</sup> This echoes the concern of collapses in crypto markets have adverse macroeconomic implications. This has become even more pertinent in light of the Terra collapse last week which has resulted in \$7.6 billion worth of savings withdrawn from Tether since then.<sup>19</sup> Now that cryptocurrencies have gotten more intimately tied to assets that affect the broader, centralized financial system, it seems that regulation to prevent “runs” on stablecoins is virtually inevitable.

Additionally, Sens. Kirsten Gillibrand (D-NY) and Cynthia Lummis (R-Wyom.) have announced their work on a comprehensive regulatory bill for the industry. The details are not yet disclosed, but the sentiment is that this bill will be wide sweeping and dictate how the space should be regulated in the future. Gillibrand noted that different groups like the Commodity Futures Trading Commission and Securities Exchange Commission will be tasked with their respective shares of the regulatory mandate. More than anything, the symbolic nature of the bill should be highlighted given that “digital assets have been increasingly politicized, with some observers fearing that it could eventually be a partisan issue” says Cointelegraph.<sup>20</sup> This sentiment is echoed by other sources as well as an article from Politico states the bill “would mark the first major bipartisan attempt to create a comprehensive framework for the U.S.’s regulation” and that “Previous legislative efforts have been limited in scope or have broken along party lines.”<sup>21</sup> This news signals a unification of congressional effort towards bringing regulation to the crypto space and the likelihood that concrete legislation will be voted in the coming years.

## Conclusion

All in all, the crypto sector is still in its infancy. There is really no telling where the industry will be in the long term and what full fledged adoption will look like and when that happens. In the shorter term, though, crypto regulation is a theme looming over the space. For a longer paper, it would have been interesting to dive deeper into the arguments against regulation and also explore what repercussions experts expect from impending regulations, both positive and negative. It is not entirely clear where the ardent supporters of cryptocurrency stand in terms of wanting regulation or not. From the sources gathered for this paper in looking at the arguments against regulation, it seems that there are definitely two camps- one welcoming

regulation, and one opposing it. Diving deeper into expert testimony from both sides would have been another worthwhile endeavor for an extended version of this assignment. The goal was to look into the issues that are present in the space right now and then see what issues proposed legislation in the near term is looking to address. This was accomplished in understanding the board categories of risk in the sector, technological risk, asset risk, and compliance risk. Then seeing why regulation might not be ideal was necessary to get a fuller picture. That is because, while it simply seems that the space is headed towards regulation, regulation itself goes against the ethos of decentralization, and it makes one wonder if the two are indeed compatible. There was still much left uncovered, in terms of issues in the space and distinct aspects of the space which may be facing regulation; a longer report would be able to devote more attention to the issues raised in terms of details and unaddressed issues. Regulation seems like it is needed to protect investors and players in the space, but at the same time will that harm the space and take away the seamlessness and innovation that it brought in the first place? A longer research paper would have looked at such questions. In the end, concrete details for regulation are yet to be discerned and or it is uncertain whether they will be upheld down the road. Regulation, however, does seem to calm the sentiments and uncertainty around the sector which could lead to wider adoption, but at the same time it could stifle its natural progression determined over time by the decisions of rational free market actors.

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